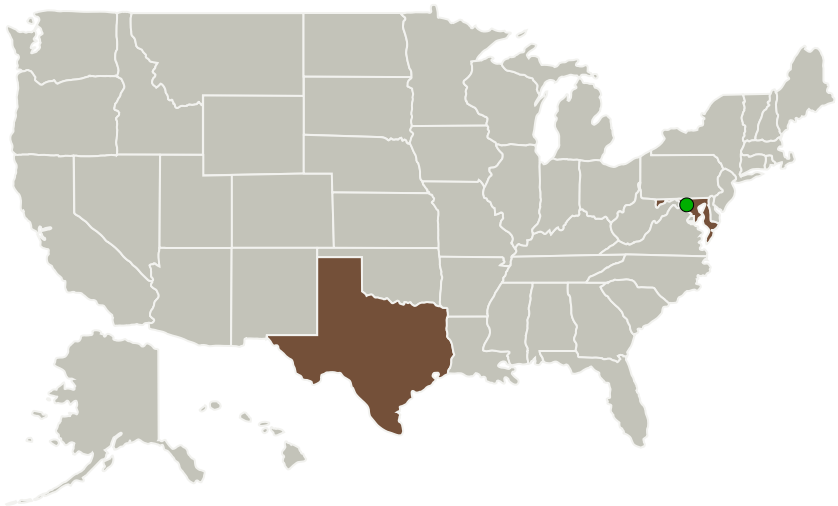
Low-Fiend Vector Magnetometer (V-400-LF), Phase I

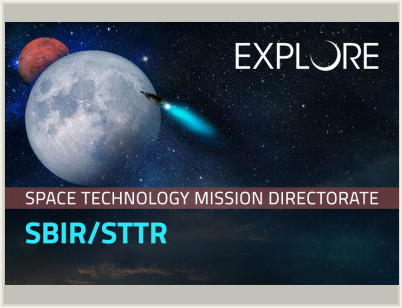
Completed Technology Project (2011 - 2011)

Project Introduction

This 2010 NASA SBIR Phase 1 proposal for an innovative Low-Field Vector Magnetometer (V-400-LF) is a response to subtopic S1.06 Particles and Field Sensors and Instrument Enabling Technologies. The V-400-LF instrument is intended for making high-resolution magnetic field measurements of planets and in interplanetary space on small satellites and spacecraft. The Phase 1 effort includes development of designs for advanced miniaturized components and a conceptual design for a miniaturized V-400-LF instrument in order to establish the feasibility of designing and fabricating a prototype V 400-LF in Phase 2. Laser-pumped helium magnetometers have proven to be world-class instruments for measuring the direction and magnitude of the geomagnetic and planetary fields. The V-400-LF will build on the heritage of the Low-field Vector Helium Magnetometer (LVHM), the Scalar Helium Magnetometer (SHM), and the laser-pumped vector/scalar Self-calibrating Vector Helium Magnetometer (SVHM). The goal of Phase 1 is development of a conceptual design for a miniaturized instrument appropriate for small spacecraft and microsatellites. This miniaturization will be accomplished through the use of advanced miniaturized components and packaging methods for the V-400-LF Sensor and Electronics. The V-400-LF can be used to measure vector components of low magnetic fields, scalar gradients (difference of vector magnitude measurements from two V-400-LF instruments), and gradient tensor elements (difference between vector components using three or more instruments) with very high stability and accuracy. The V-400-LF will have a dynamic range of +/- 1,000 nT, a sensitivity of 10 pT/rtHz at 1 Hz, and a calibrated accuracy of +/- 0.5 nT. The sample rate will be 430 Hz. The TRL is expected to be 4 at the end of the Phase 1 contract.

Primary U.S. Work Locations and Key Partners





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Organizations Performing Work	Role	Type	Location
Polatomic, Inc.	Lead Organization	Industry	Richardson, Texas
Goddard Space Flight Center(GSFC)	Supporting Organization	NASA Center	Greenbelt, Maryland

Primary U.S. Work Locations	
Maryland	Texas

Project Transitions

February 2011: Project Start

August 2011: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/138276)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Polatomic, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Robert E Slocum

Co-Investigator:

Robert Slocum

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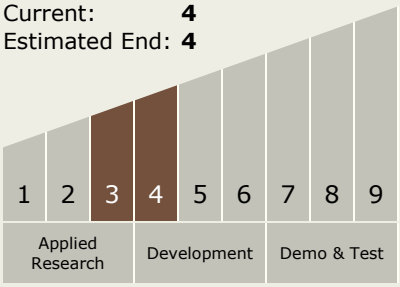
Technology Maturity (TRL)

Start: **3**
Current: **4**
Estimated End: **4**



Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.3 In-Situ Instruments and Sensors
    - TX08.3.1 Field and Particle Detectors

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System